



## **G20 New Industrial Revolution Action Plan**

### **1. Overview**

In response to the emergence of a “New Industrial Revolution” (NIR), and to enable more people to benefit from this revolution, G20 members are encouraged to take joint actions, enhance existing communication and collaboration mechanisms, and continue cooperation on research, employment promotion, education and workforce skills, standards, new industrial infrastructure, intellectual property rights (IPR) protection and enforcement, and industrialization in developing countries.

### **2. Background**

Currently, G20 members share a common vision to jointly promote global economic recovery, leading to medium and long-term sustainable economic growth. Industry, particularly manufacturing and manufacturing-related services, is one of the key factors to achieve the aforementioned goal. We are in the midst of a new industrial revolution which has the potential to transform conventional production processes and business models and create new industry models.

The NIR has the potential to improve productivity and competitiveness, reduce energy and resource consumption, and hence to protect the environment and increase resource efficiency and effectiveness. This will bring significant opportunities for G20 members to achieve medium to long-term economic growth and sustainable development bearing in mind the aspirations of the 2030 Agenda for Sustainable Development, particularly its Goal No. 9. At the same time, some countries, organizations and individuals may experience difficulties taking part in these processes, thus generating social impacts. Continued discussions and cooperation are called for to guide these processes and maximize the benefits and mitigate the negative impacts of the expected technological and industrial changes.

In the mid-18th century, the first industrial revolution featured the invention and application of the steam engine, which greatly improved productivity and changed human society into a modern industrialized one. The subsequent industrial revolutions featured the invention and application of electricity, computers and the Internet, continuously pushing the industrial development to new heights. The ongoing industrial revolution characterized by the intelligent interconnectedness of people, machine and resources driven by the convergence of Next Generation Information Technology and advanced manufacturing, is increasingly blurring the boundary between the physical and the digital world and between industry and services, and presents countless opportunities to harness modern technologies for pursuing enhanced economic growth with the potential for more efficient and environmentally friendly processes.

Progress is being made in the fields of Internet of Things (IoT), big data, cloud computing, Artificial Intelligence (AI), robotics, additive manufacturing, new materials, augmented reality, nanotechnology and biotechnology. These technological developments are enabling smart manufacturing, customization, collaborative production and other new production modes and business models. They have dramatically reduced development and production cycles, created new opportunities for industrial diversification, and also allowed for the creation of new products and services, such as driverless vehicles, portable smart devices, drones and smart grids.

In recent years, some G20 members have launched medium and long-term manufacturing strategies to embrace the development opportunities and address challenges brought by the new industrial revolution, including Industrie 4.0 in Germany, Industrie du Futur in France, Digitising European Industry strategy at a European level, Manufacturing Innovation 3.0 in Republic of Korea, Make in India in India, Industria Conectada 4.0 in Spain, National Technology Initiative in Russia, New Robot Strategy in Japan, Manifattura Italia in Italy, National Productive Plan of Argentina and China Manufacturing 2025 in China, and all of these initiatives consist of important moves to push the development of NIR.

### **Multi-stakeholder communication principle**

The NIR brings new challenges to enterprises, workers, consumers, governments, research institutions, industry organizations and the society as a whole. New industry and business models will be established and supersede conventional ones; workers will need to adapt to new job profiles and skills requirements; the integration of innovative new technologies needs to be enabled;

infrastructure, standards and policies might need to be developed or adjusted to adapt to the new environment. To better address these challenges, multi-stakeholder approaches are needed within and across countries, many of which are already underway within a number of organizations. Within each member, communication and collaboration among all stakeholders of NIR, such as government, enterprises, research institutions, trade unions, employees and business associations will help promote the smooth implementation of NIR while balancing respective interests. G20 members are encouraged to strengthen communication and collaboration to help address challenges common to all members.

## **Proposed Actions**

### **4.1 Research collaboration**

**Background:** As the premier forum for international economic cooperation, G20 is encouraged to facilitate international cooperation on joint research and issues related to policy.

**Objective:**

Discuss NIR trends and implications to reach a common understanding of this process. In the context of NIR, collaboratively address possible challenges in policies, technologies, investment, trade and people's livelihood encountered by all members.

Share knowledge and experience on research related to technology innovation, industrial policies and programs.

**Actions:**

Organize NIR-related conference and symposium to discuss industry development, technology trends, policy coordination, workforce skills requirements and promote best practices sharing and exchange of lessons learnt in implementing national technology related strategies among G20 members.

Encourage enterprises and relevant institutions to carry out extensive and in-depth research on R&D and application of emerging technologies.

Consider impacts on and challenges to social norms, ethics and workers equality (especially regarding to gender, age, social background...) caused by emerging technologies, and strengthen cooperation in risk assessment, management and communication mechanisms.

Release a G20 NIR Report prepared by OECD with UNCTAD and UNIDO which provides an overview of opportunities and challenges brought about by NIR.

#### **4.2 Role of small and medium sized enterprises (SMEs)**

**Background:** SMEs are a major source of innovation and employment in many economies, and contributing to inclusive and sustainable economic growth. However, SMEs often lack the necessary resources and information to help them implement and benefit from new technologies.

##### **Objective:**

Encourage SMEs and start-ups, to engage in NIR and unleash their innovative capability as a major driving force in NIR.

Facilitate SMEs' access to information and resources on developing a digital operation.

##### **Actions:**

Explore methods and best practices to cultivate NIR awareness and support SMEs to adopt new and cost-effective technologies and business models.

Encourage members to establish platforms to support SMEs digital transformation and capacity building.

Encourage SME-to-SME and SME-to-larger enterprise to exchange best practices for NIR technology adoption and development through initiatives, such as the World SME Forum.

Foster open innovation model, and encourage more collaboration among established large companies and innovative SMEs and start-ups to better adapt to NIR.

### 4.3 Employment and workforce skills

**Background:** There is scope to improve the adaptability of workforce skills and labor market conditions to structural change in many countries. Such improvements will help to address the challenges the NIR poses to employment and education. Better social outcomes from the NIR will also contribute to meeting the G20's employment goals.

**Objective:** Strengthen workforce skills training, and adapt the competencies and skills of the labor force to NIR needs.

Create high-value and more secure jobs in the transformation of the traditional manufacturing and business models brought by the NIR.

**Actions:**

Highlight and conduct in-depth studies of NIR's influence on employment and social systems and give overall consideration in the long run to ensure that the benefits of technological and industrial changes are inclusive and widely shared.

Encourage communication and cooperation between educational and training institutions and businesses, with respect to the content of curricula and skill requirements of NIR.

Encourage more people, especially women and girls, to pursue studies in STEM subjects at all levels of education.

Encourage the disadvantaged groups in the labor force such as the unemployed youth, the disabled and the displaced, to benefit from appropriate forms of assistance in the labor market and in training to help them adjust to the changes brought by the NIR.

Promote policy exchanges, such as occupational safety, health protections and international labor mobility.

Explore methods to further facilitate talent exchange and training globally in the fields of priority sectors, such as smart manufacturing, industrial software, green manufacturing and new services.

#### 4.4 Cooperation on standards

**Background:** The NIR is accelerating the emergence and application of new technologies and has the potential to create completely new manufacturing paradigms. Standards face challenges due to integration and convergence of technologies. To this end, standards development for enabling the NIR may need to be accelerated. G20 members should support open, inclusive, mutually beneficial and efficient cooperation on standards development in standards developing organizations.

**Objective:** Promote exchanges on standardization for emerging industry fields among G20 members, representatives from standardization organizations, enterprises, industrial and trade associations and governments and encourage cooperation on standards development.

Raise the mutual awareness of the latest standards development in the new industrial fields.

Development of standards should be industry-led, based on principles of openness, transparency and consensus, and standards should not act as a barrier to trade, competition, or innovation.

**Actions:**

Encourage exchanges and cooperation among private sector, enterprises, standard setting organizations and research institutions in terms of developing standards most suited to the needs of the stakeholder communities.

Encourage private sector and enterprises to participate in conversations on standards for NIR.

Encourage members to strengthen their cooperation and communication of conformity assessment procedures, certification and accreditation.

#### 4.5 New industrial infrastructure

**Background:** New industrial infrastructure may be necessary for creation of new industries and business models, and can enable the manufacturing industry to respond to individualized demands at lower cost and in shorter time. New industrial infrastructure, including distributed energy systems, IoT, mobile and high-speed Internet, industry cloud and industrial operating systems,

plays an important role in the development of NIR.

**Objective:** Explore key infrastructure that meet the development requirements of NIR.

Explore opportunities for sustainable and shared construction, usage and operation models.

**Actions:**

Explore cooperation models for G20 members on research and development of key technologies and international standards of new industrial infrastructure.

Enhance dialogue and exchanges on best practices to design and operate new industrial infrastructure so as to share experiences.

#### **4.6 Intellectual property rights protection**

**Background:** The NIR could trigger a sharp increase in breakthrough technologies potentially leading to considerable transformation in industrial sectors. G20 members anticipate that the rate at which new technologies are disseminated and applied will continue to accelerate. Ensuring adequate and effective protection and enforcement of IP inherent in these technological innovations is one of the key drivers for such continued innovation. Therefore, raising awareness for the benefits of and implementing IPR protection internationally is crucial in order to actively support and respond to the NIR.

**Objective:** In line with relevant existing multilateral treaties and agreements to which they are parties, including the TRIPs Agreement, G20 nations

reiterate the relationship between IPR protection and technological innovation and promote collaboration on IPR protection among G20 members,

promote voluntary knowledge sharing in the New Industrial Revolution including through the effective protection and enforcement of IPR and voluntary technology transfer, and

recognize that enterprises are free to base technology transfer decisions on business and market

considerations, and are free to independently negotiate and decide whether and under what circumstances to assign or license intellectual property rights to affiliated or unaffiliated enterprises.

**Actions:**

Deepen communication and strengthen international cooperation mechanisms for effective IPR protection through existing institutions and organizations.

Focus on capacity building, explore methods and cooperation to increase IPR licensing and outreach to research institutes, universities and businesses and support innovators, creators and entrepreneurs to maximize the value of their work.

Stimulate the discussion among G20 members on intellectual property issues, in particular the importance of effective protection and enforcement of IPR, in existing expert fora, including WIPO.

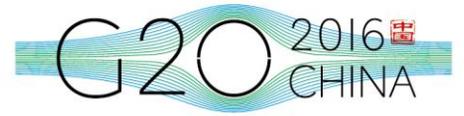
#### **4.7 Industrialization in developing countries**

**Background:** The NIR may greatly accelerate the industrialization in developing countries and help reduce gaps in capacity. It is our shared interest to facilitate the development of NIR for developing countries.

**Objective:** G20 members should encourage cooperation on production capacity and sustainable (i.e. green and inclusive) development to promote implementation of the 2030 Agenda for Sustainable Development and co-drive inclusive and sustainable industrialization in developing countries, in particular the least developed countries.

**Actions:**

Support developing countries by sharing best practices in formulating and implementing industrial development strategies and programs aligned with the NIR, with a view to reduce gaps in technological and innovative capacity, increase productivity and increase incomes around the world.



Encourage voluntary partnerships between companies and research institutes as well as universities from G20 members and other developing countries on technologies related to NIR.

Support efforts to promote voluntary knowledge diffusion and technology transfer on mutually agreed terms and conditions.

Enable developing countries to optimize resource usage during their accelerated industrialization processes to promote sustainable development and social inclusion.

Promote awareness of environment-friendly technologies, enabled by NIR and support the capacity building of environment protection for developing countries.

